



## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

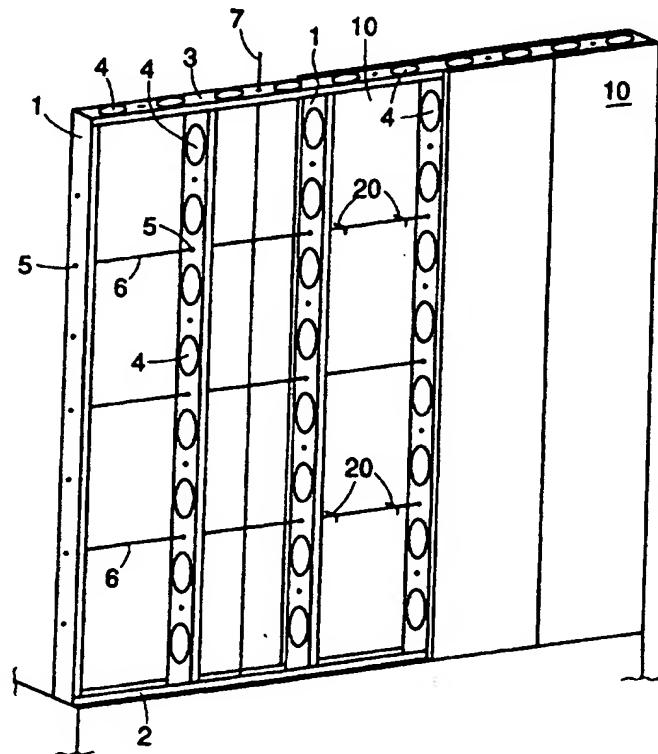
(51) International Patent Classification 6 :	A1	(11) International Publication Number: <b>WO 96/18777</b>
<b>E04B 2/86</b>		(43) International Publication Date: 20 June 1996 (20.06.96)

(21) International Application Number: <b>PCT/SE95/01515</b>	(81) Designated States: AL, AM, AT, AU, BB, BG, BR, BY, CA, CH, CN, CZ, DE, DK, EE, ES, FI, GB, GE, HU, JP, KE, KG, KP, KR, KZ, LK, LR, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, TJ, TM, TT, UA, UG, US, UZ, VN, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG), ARIPO patent (KE, LS, MW, SD, SZ, UG).
(22) International Filing Date: 14 December 1995 (14.12.95)	
(30) Priority Data: 9404396-5 14 December 1994 (14.12.94) SE	
(71)(72) Applicant and Inventor: SJÖDÉN, Birger [SE/SE]; Kronvägen 18, S-175 61 Järfälla (SE).	
(74) Agent: CLAESSEN, Lennart; Patent Ability Lennart Claesson AB, P.O. Box 4110, S-175 04 Järfälla (SE).	Published <i>With international search report. In English translation (filed in Swedish).</i>

(54) Title: A METHOD TO BUILD VERTICAL WALL PORTIONS OF REINFORCED CONCRETE, AS WELL AS CONSTRUCTION SHORE, MOUNTING ELEMENT AND CONSTRUCTION ELEMENT INTENDED TO BE USED IN THE METHOD

## (57) Abstract

A method to build vertical wall portions, in which plate shaped construction elements are used and are mounted on both sides of a support. The support is erected by vertical shores or the like, provided with horizontal elements, for instance in the form of bars. The bars may be constituted by reinforcing irons. In the invention construction elements are used provided with hook shaped mounting elements that extend outwards from one side and are located and designed such that they can be hooked on and fixed to the horizontal elements of the support. The invention also refers to construction shores and mounting elements to be used with the method.



Best Available Copy

**FOR THE PURPOSES OF INFORMATION ONLY**

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AT	Austria	GB	United Kingdom	MR	Mauritania
AU	Australia	GE	Georgia	MW	Malawi
BB	Barbados	GN	Guinea	NE	Niger
BE	Belgium	GR	Greece	NL	Netherlands
BF	Burkina Faso	HU	Hungary	NO	Norway
BG	Bulgaria	IE	Ireland	NZ	New Zealand
BJ	Benin	IT	Italy	PL	Poland
BR	Brazil	JP	Japan	PT	Portugal
BY	Belarus	KE	Kenya	RO	Romania
CA	Canada	KG	Kyrgyzstan	RU	Russian Federation
CF	Central African Republic	KP	Democratic People's Republic of Korea	SD	Sudan
CG	Congo	KR	Republic of Korea	SE	Sweden
CH	Switzerland	KZ	Kazakhstan	SI	Slovenia
CI	Côte d'Ivoire	LJ	Liechtenstein	SK	Slovakia
CM	Cameroon	LK	Sri Lanka	SN	Senegal
CN	China	LU	Luxembourg	TD	Chad
CS	Czechoslovakia	LV	Latvia	TG	Togo
CZ	Czech Republic	MC	Monaco	TJ	Tajikistan
DE	Germany	MD	Republic of Moldova	TT	Trinidad and Tobago
DK	Denmark	MG	Madagascar	UA	Ukraine
ES	Spain	ML	Mali	US	United States of America
FI	Finland	MN	Mongolia	UZ	Uzbekistan
FR	France			VN	Viet Nam
GA	Gabon				

A method to build vertical wall portions of reinforced concrete, as well as construction shore, mounting element and construction element intended to be used in the method.

5

The present invention refers to a method to build vertical wall portions, in which plate shaped construction elements are used and mounted on both sides of a support erected in advance. At first the support is erected of vertical shores 10 mounted between a bottom and a top profile. The shores and the other profiles are preferably made of sheet metal. The support is then provided with horizontal elements, for instance in the shape of rods mounted at predetermined levels. The bars can be constituted by reinforcing bars.

15

According to the invention construction elements are utilized which are provided with mounting elements that can be hook-shaped and extend outwards from one of the lateral surfaces and be located and designed such that they can be hooked on and fixed to the horizontal elements of the support. The 20 invention also refers to a mounting element for use in the method.

At traditional casting of concrete walls much material and work is utilized for the casing itself and demolition of 25 moulds after casting. This is a heavy work that often requires access to a hoisting crane. The casing also implies a special adaption for each construction project and has often to be carried out in stages since a limited number of moulds are available. The reinforcing work at traditional 30 casing and casting is also time-consuming and circumstantial. These and other inconveniences are reduced or completely eliminated by means of the present invention. The sheet metal shores contained in the wall structure serves both as reinforcement in itself, as well as a support of the present 35 reinforcement and also as a support of the remaining wall plates - the finished wall surface. The bottom and top profiles of the sheet metal shores also serves as a fixation of the standing reinforcement in the wall structure. Even oiling of moulds and removal of them is eliminated with this

method where the mould is remaining and forms a finished wall surface.

By means of the method and the construction elements 5 according to the invention a simple method is provided to achieve cast and reinforced walls. The construction elements can already at the assembly consist of or be provided with an external facing layer or a surface material for interior walls. By mould-casting no extra material is required to 10 build moulds since the mounted construction elements constitute a durable mould that is contained in the finished wall. The shores are provided with holes to enable supply and facilitate the distribution of the concrete. It is also 15 possible to utilize construction elements containing plate shaped insulation material or extra cavities for insulation when the construction elements according to the invention are used in concrete moulded walls.

The invention is now going to be described in closer detail 20 with reference to the drawing.

Figure 1 shows a wall portion assembled according to an embodiment of the invention.

25 Figure 2 shows an example of the structural design of a construction element with hook shaped mounting elements according to the invention.

30 Figure 3 shows an example of a hook shaped mounting element intended to be utilized in connection with the invention.

35 The Figures 4 - 7 show a second embodiment of profiles of a wall portion according to the invention, whereby Figure 4A shows a shore from one side, Figure 4B this shore in profile and Figure 4C an enlarged portion C of the shore.

Figure 5A in a corresponding way shows a portion of a bottom or a top profile from one side, while Figure 5B shows this profile in a profile and Figure 5C shows the bottom or the top profile in perspective.

5

Figure 6 shows how the profile according to Figure 4A-C can be fixed to the bottom and the top profile respectively.

10 Figure 7A shows a corner of a shore support and a bottom profile from the side and Figure 7B shows a view from the above according to section B-B in Figure 7A.

15 The wall portion according to Figure 1 is erected by a support of vertical shores 1. These are preferably mounted between a floor bar 2 and a roof rail 3. Shores as well as rails are preferably made of sheet metal in for instance a U-profile. Most of the shores and the roof rail are provided  
20 with large holes 4, through which concrete or other material can be entered. The shores 1 are moreover provided with smaller holes 5 at predetermined locations, adapted for mounting of horizontal bars 6 or reinforcing irons. Even the floor and the roof rails may be provided with holes for  
25 reinforcing irons 7. By means of shores and rails with exact fit and exactly located holes for horizontal bars or reinforcing irons a support with predetermined measures simply can be assembled.

30 A plate shaped construction element 10 is provided with mounting elements 20, which are hook shaped and extend outwards from one of the lateral surfaces of the construction element. The mounting elements are located and designed such that they can be hooked on and fixed to the horizontal bars 6  
35 of the support. Each mounting element consequently has a spacing portion which after anchorage in the plate shaped construction element may extend essentially perpendicular outwards from the lateral surface with a predetermined length, and a retainer portion that extends essentially

perpendicular from the spacing portion at its external end so that a hook is formed. The plate shaped construction elements can simply be hooked on to the horizontal bars by all of the hooks of the mounting elements being directed in the same direction and by the location of the mounting elements and the length of the spacing portion being adapted to the location of the horizontal bars and the dimensions of the shores. Preferably the construction elements 10 are arranged to rest on a shoulder or a construction element from the underlying floor when they are hooked on the support, whereby the mounting elements do not need to carry the whole weight of the construction element. With appropriate dimensioning in this manner the plate shaped construction elements thus hanged on may be held in place by the mounting elements and function as mould-walls at concrete moulding in order then to remain and form or support the surface material of the wall.

As is evident of Figure 2 the hook shaped mounting elements 20 can be formed with an anchoring portion 21 that anchors them in a reinforcing layer 11 in the plate shaped construction element 10. In figure 2 for sake of clarity a portion has been broken through so that the reinforcing layer 11 and two whole mounting elements 20 are shown. The anchoring portion 21 as shown can be formed as a cross 22 which can be fixed to or constitute a part of the reinforcing layer 11, but it can also be of other form, such as disc shaped or bar shaped. From the anchoring portion 21 the spacing portion 23 extends essentially perpendicularly, and the retainer portion 24 extends essentially perpendicularly from the other end of the spacing portion.

In a preferred embodiment the plate shaped construction elements 10 may be moulded of concrete and reinforced. Figure 2 only diagrammatically shows how they can be built. The thickness may be down at one or some centimeters.

A particularly advantageous embodiment of the mounting element according to the invention is evident from Figure 3. The spacing portion 23 in this embodiment is provided with a

hinge 25, which at mounted mounting element is placed at the plate surface. The hinge 25 is designed such that the mounting elements at transport and storage can be folded to the side, while the essentially perpendicular folded out 5 still can support the construction elements at an intended level. Within the scope of the invention other variants of mounting elements also can be used. These can for instance be made of flat iron or of sheet metal profiles and also the anchorage in the construction elements may be different.

10

In the embodiment according to Figures 4 - 7 sheet metal shores are used with a special profile for assembly of the shore support of the concrete moulded wall portion. Figure 4 A - C thus shows a shore which similarly to the bottom and 15 the top profile according to Figure 5A - C are constructed as a U-beam with a web 31 and 41 respectively and two shanks 32 and 42 respectively and 33 and 43 respectively. From the end of each shank further a portion extends outwards, 34 and 44 respectively and 35 and 45 respectively, and these are ended 20 by bent backwards flanges 36 and 46 respectively 37 and 47 respectively. All angles are essentially right. The shore 30 according to Figure 4 A-C as in the first embodiment is broken through by large holes, through which concrete may flow, and by smaller holes 38 for bars or reinforcing iron 25 with an exactly defined location. Moreover the outwards directed portions 34 and 35 with the flanges 36 and 37 at certain locations provided with recesses 39 adapted to let reinforcing iron of different dimensions to be able to be placed and remain in its location against the shank 32 or 33 30 with a space between the reinforcement and the flange 36 and 37 respectively. By this design of the shores horizontal reinforcement can be made at both sides of the wall by only placing iron in the recesses 39. The bottom and top profiles according to the Figures 5 A - C are designed as the shores 35 according to the Figures 4 A - C but are provided with holes 48, in which vertical reinforcing iron can be mounted, and angled recesses 49 in which vertical shores can be mounted. When vertical shores are mounted at the bottom and the top profiles they can simply be locked by means of lock pins 50

in for this located holes 51 according to Figure 6. At a corner of shore support 30 and a bottom profile 40 a double stay 52 with conical angled out ends can be provided to fit in into holes 53 and 54 arranged for this to hold the shores 5 at right angle.

Other forms of construction shores and construction elements can also be utilized within the scope of the present invention which only shall be limited by scope of the patent 10 claims.

## PATENT CLAIMS

1. A method to build vertical wall portions of reinforced concrete or similar material, characterized therein that a support is built up from vertical profiles which form shores, connected by the ends through horizontal bottom and top profiles, that reinforcement is formed by the profiles together with reinforcing bars that are placed in holes or recesses in the profiles, that plate shaped construction element are mounted on both sides of the support by being hooked on the profiles or the reinforcing bars, and that concrete or similar material is filled through holes in the support whereby the finished wall portion is formed by the support, the reinforcing bars, the construction elements and the solidified concrete.
2. A method according to claim 1, characterized therein that at least the construction elements that are mounted on one side of the support are provided with hook shaped mounting elements that extend outwards from one side and placed and designed such that they can be hooked on to and fixed to the support together with the construction element.
3. A method according to claim 1, characterized therein that the horizontal elements are constituted by bars or reinforcing irons that have been mounted between the shores so that the hook shaped mounting elements can be hooked on to the same.
4. A method according to claim 1, characterized therein that the horizontal elements are constituted by protrusions or hole edges on the shores or end beams on to which at least one of the hook shaped mounting elements can be hooked.
5. A method according to any of the preceding claims, characterized therein that the plate shaped construction elements before the mounting are provided with a facing surface or an interior wall surface.

6. A construction shore intended to be used in the method according to any of the preceding claims, characterized in that it is provided with protrusions, recesses or holes for bars or reinforcing irons located at defined positions and that it is broken through by larger holes through which concrete and the like can float.

7. A construction shore according to claim 6, characterized in that it is designed like an U-beam with additional elements turned outwards and flanges in which recesses for reinforcing irons are arranged.

8. A mounting element for use in the method according to any of the patent claims 1 - 6, characterized in that it includes an anchoring portion for anchorage in the plate shaped construction element, a spacing portion which after mounting extends outwards essentially perpendicular from one plate surface of the construction element and a retainer portion that extends essentially perpendicular from the spacing portion at its outer end at a defined distance from the plate surface.

9. A mounting element according to claim 8, characterized in that the spacing portion at the position of the plate surface is provided with a hinge so that it can be folded against the plate surface at transport and storing.

10. A construction element intended for building vertical wall portions, characterized in that it is constituted by a plate shaped material and is provided with hook shaped mounting elements that extend outwards from one of the lateral surfaces of the plate and are located and designed such that they can be hooked on and fixed on the side of horizontally arranged elements which constitute a part of or is supported by shores or the like.

1/4

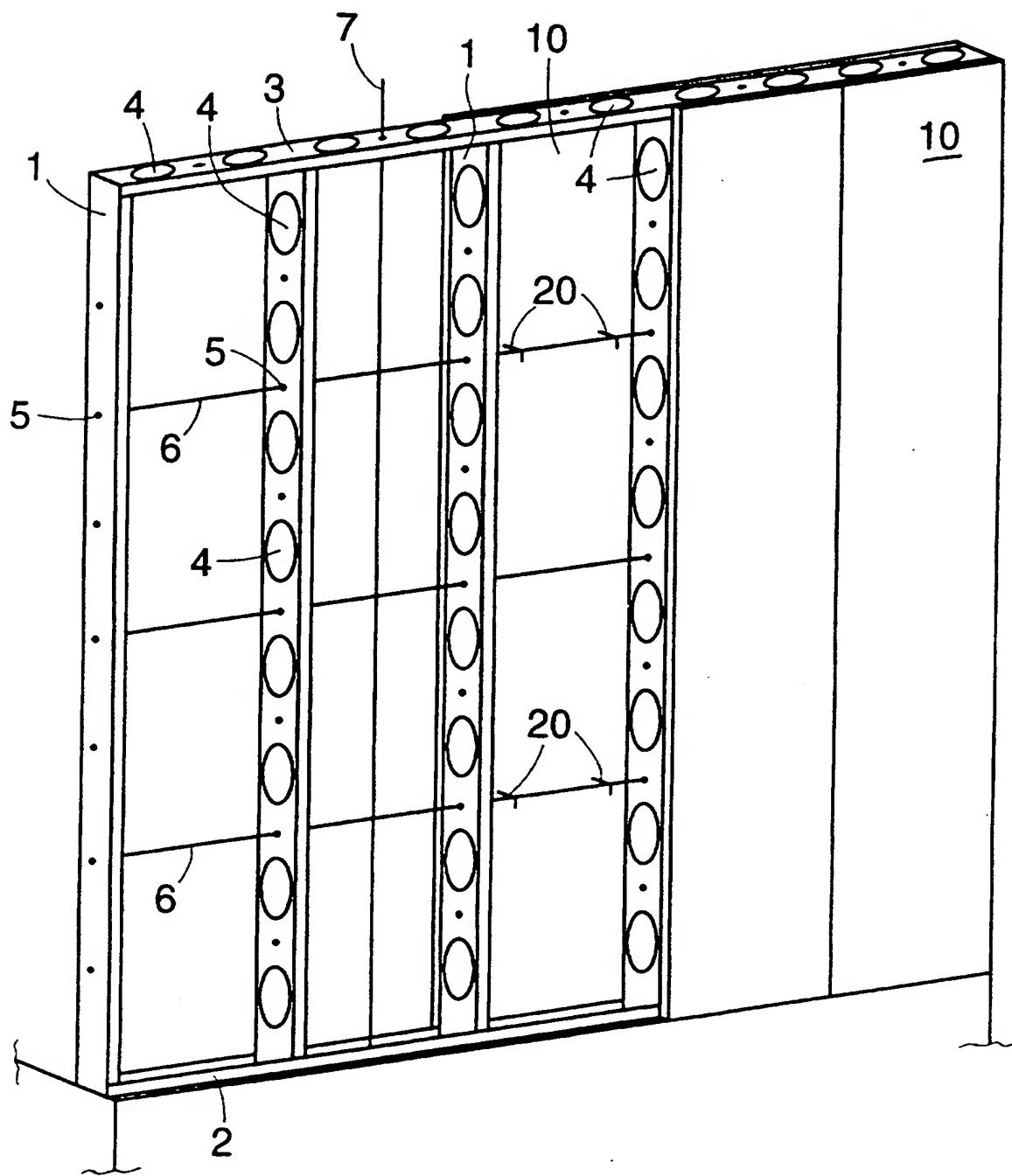


Fig. 1

SUBSTITUTE SHEET (RULE 26)

2/4

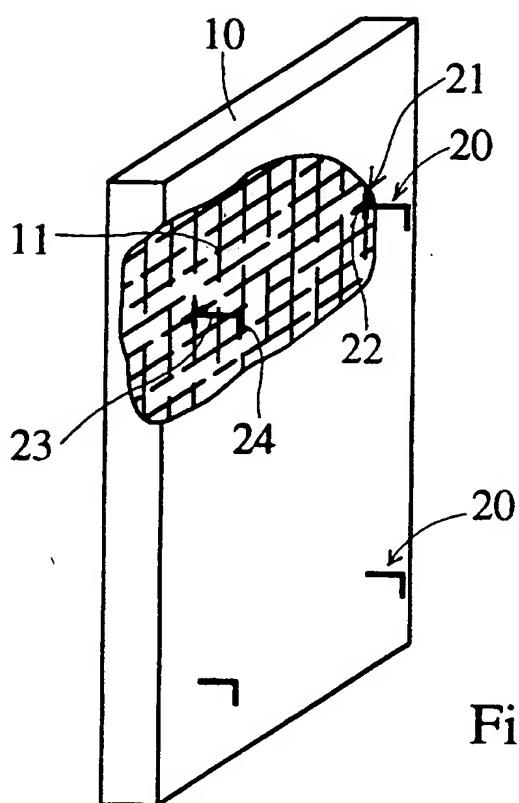


Fig. 2

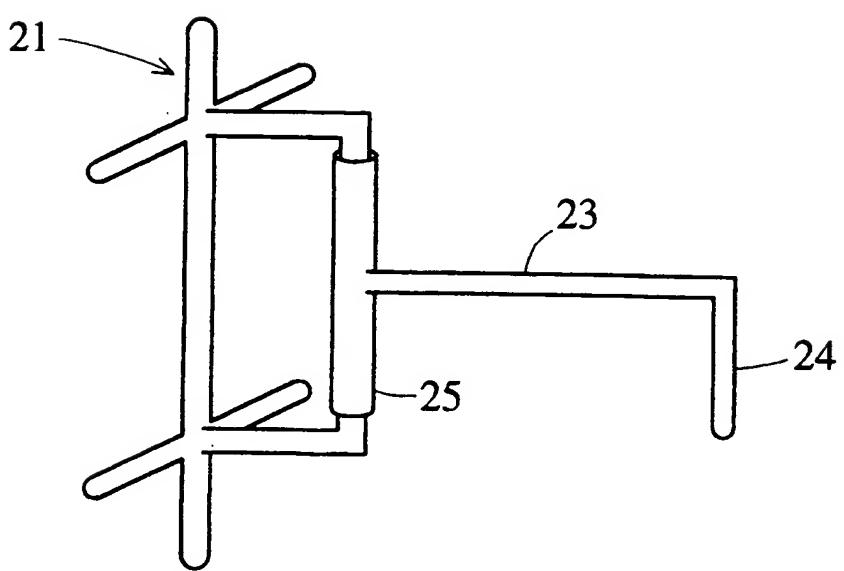


Fig. 3  
SUBSTITUTE SHEET (RULE 26)

3/4

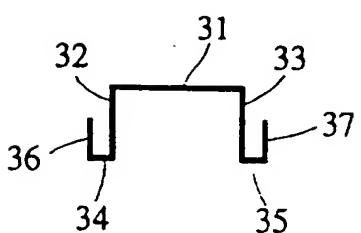
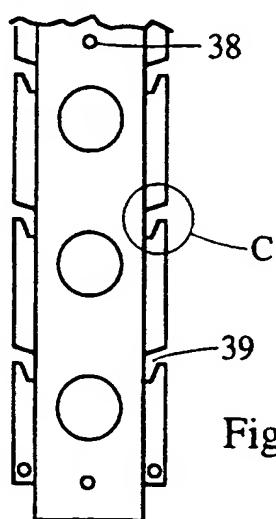
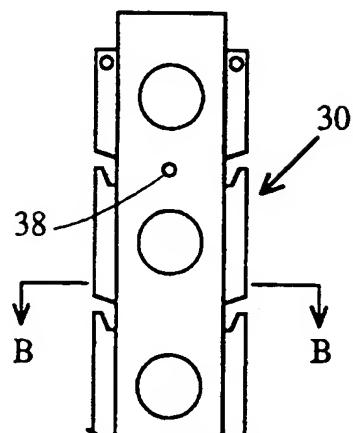


Fig. 4B

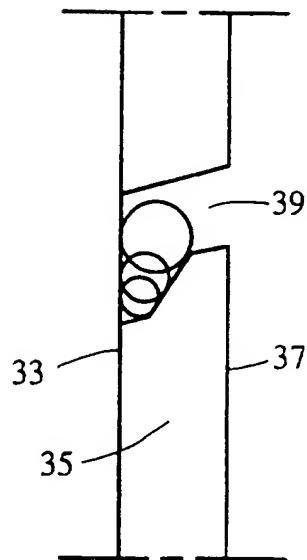


Fig. 4C

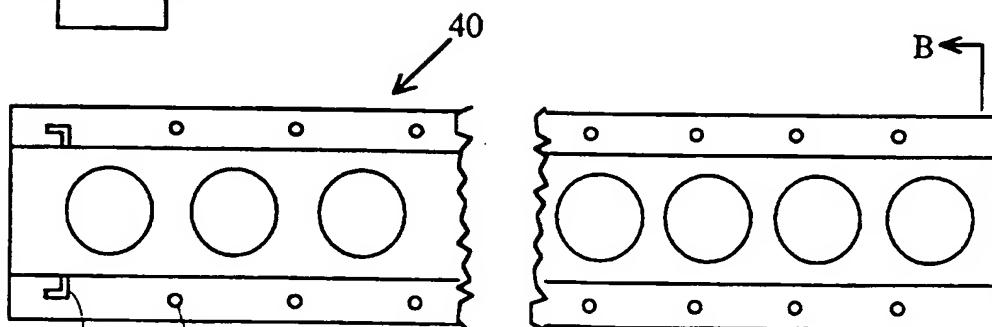


Fig. 5A

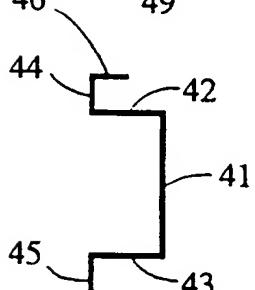


Fig. 5B

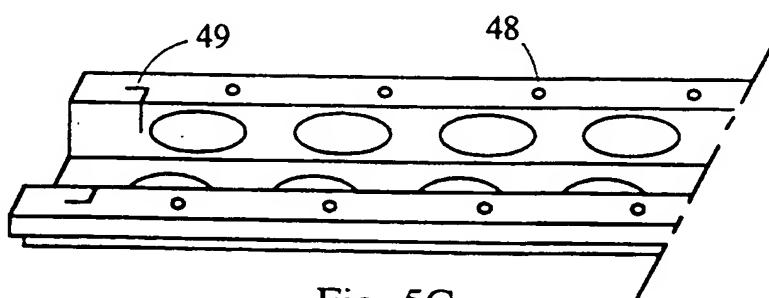


Fig. 5C

SUBSTITUTE SHEET (RULE 26)

4/4

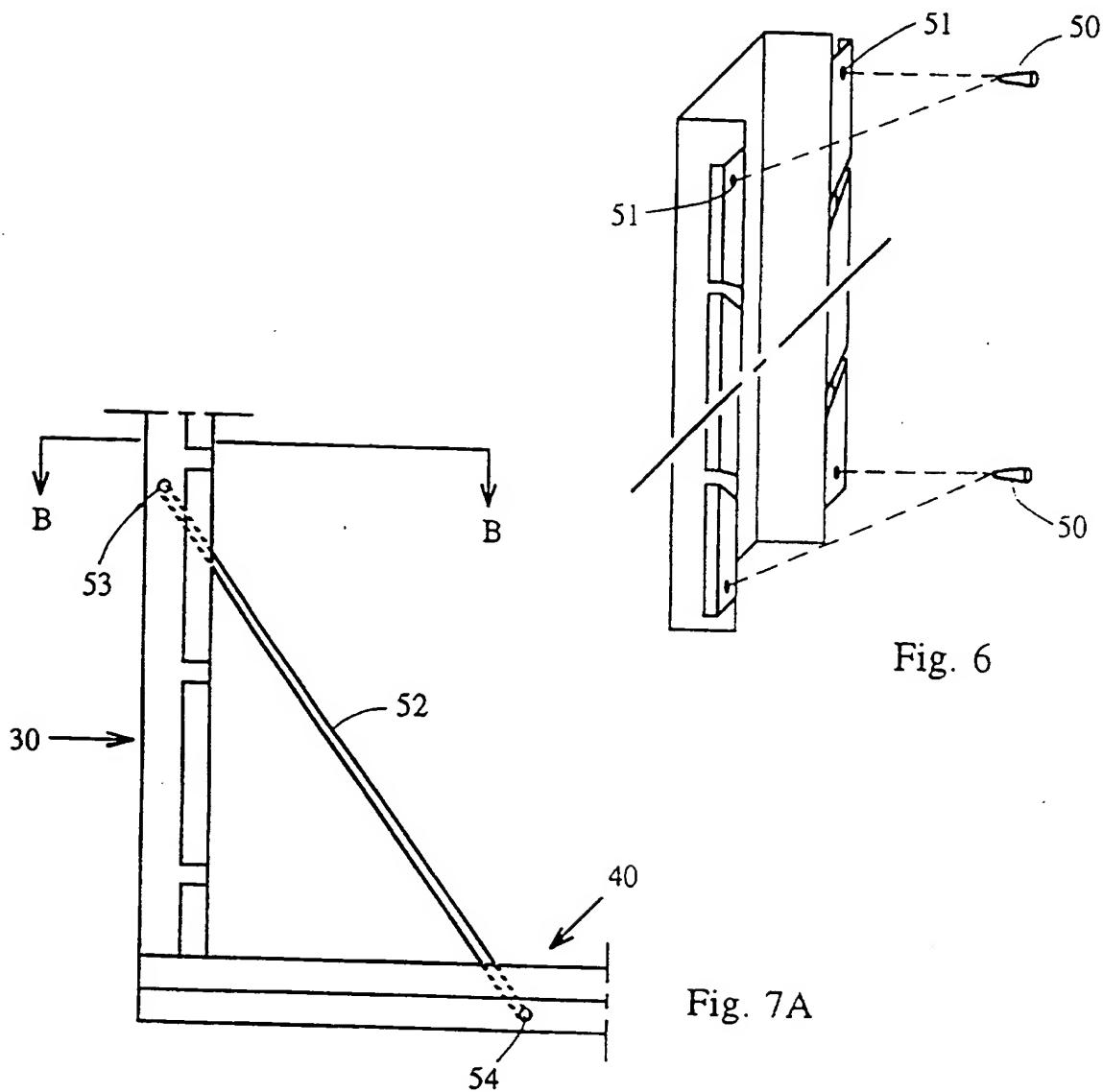


Fig. 6

Fig. 7A

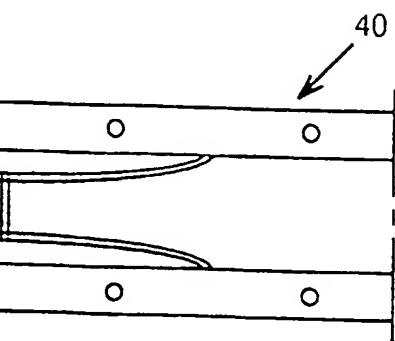


Fig. 7B

1  
INTERNATIONAL SEARCH REPORTInternational application No.  
PCT/SE 95/01515

A. CLASSIFICATION OF SUBJECT MATTER		
IPC6: E04B 2/86 According to International Patent Classification (IPC) or to both national classification and IPC		
B. FIELDS SEARCHED		
Minimum documentation searched (classification system followed by classification symbols)		
IPC6: E04B, E04F Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched SE,DK,FI,NO classes as above		
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 8204088 A1 (HART, G.R.), 25 November 1982 (25.11.82), page 5, line 22 - page 7, line 28, figures 1-3 --	1-6,8,10
Y	WO 8503966 A1 (DEBUYST, J. ET AL), 12 Sept 1985 (12.09.85), figures 1-5, abstract --	1,2,5-7,10
Y	US 4128979 A (R.S. PRICE), 12 December 1978 (12.12.78), figure 1, abstract --	1,2,5-7,10
A	EP 0364768 A1 (VS VEREINIGTE SPEZIALMÖBELFABRIKEN VERWALTUNGS-GMBH), 25 April 1990 (25.04.90), figures 1-4, abstract --	1-10

 Further documents are listed in the continuation of Box C. See patent family annex.

- \* Special categories of cited documents
- "A" document defining the general state of the art which is not considered to be of particular relevance
- "B" earlier document but published on or after the international filing date
- "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed
- "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- "X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- "Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
- "&" document member of the same patent family

Date of the actual completion of the international search  12 March 1996	Date of mailing of the international search report  15 -03- 1996
Name and mailing address of the ISA/ Swedish Patent Office Box 5055, S-102 42 STOCKHOLM Facsimile No. + 46 8 666 02 86	Authorized officer  Ingemar Hedlund Telephone No. + 46 8 782 25 00

## INTERNATIONAL SEARCH REPORT

International application No. PCT/SE 95/01515
--

## C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 8701751 A1 (COLOMBAN, M.), 26 March 1987 (26.03.87), figure 1, abstract --- -----	1-10

**INTERNATIONAL SEARCH REPORT**  
Information on patent family members

05/02/96

International application No.  
PCT/SE 95/01515

Patent document cited in search report	Publication date	Patent family member(s)		Publication date
WO-A1- 8204088	25/11/82	AU-B,B- EP-A-	562542 0079344	11/06/87 25/05/83
WO-A1- 8503966	12/09/85	BE-A,A- EP-A-	899065 0174347	03/09/84 19/03/86
US-A- 4128979	12/12/78	BE-A,A- CA-A- CH-A- DE-A,B,B FR-A,B- GB-A- NL-A-	868770 1044870 625009 2832430 2430488 1600887 7807256	05/01/79 26/12/78 31/08/81 14/02/80 01/02/80 21/10/81 08/01/80
EP-A1- 0364768	25/04/90	DE-A- DE-A-	3835501 5890395	03/05/90 06/05/93
WO-A1- 8701751	26/03/87	AU-B,B- AU-A- EP-A,B- SE-T3- HR-A-	589995 6221286 0270541 0270541 921228	26/10/89 07/04/87 15/06/88 31/10/94

**This Page is Inserted by IFW Indexing and Scanning  
Operations and is not part of the Official Record**

## **BEST AVAILABLE IMAGES**

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images include but are not limited to the items checked:

- BLACK BORDERS**
- IMAGE CUT OFF AT TOP, BOTTOM OR SIDES**
- FADED TEXT OR DRAWING**
- BLURRED OR ILLEGIBLE TEXT OR DRAWING**
- SKEWED/SLANTED IMAGES**
- COLOR OR BLACK AND WHITE PHOTOGRAPHS**
- GRAY SCALE DOCUMENTS**
- LINES OR MARKS ON ORIGINAL DOCUMENT**
- REFERENCE(S) OR EXHIBIT(S) SUBMITTED ARE POOR QUALITY**
- OTHER:** \_\_\_\_\_

**IMAGES ARE BEST AVAILABLE COPY.**

**As rescanning these documents will not correct the image problems checked, please do not report these problems to the IFW Image Problem Mailbox.**